Self-efficacy of mathematics students' on e-learning during covid 19 pandemic

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Abstract. This research aims to describe the self-efficacy profile of students majoring in mathematics education in e-learning during the covid-19. The research subjects were 98 students of IAIN Metro mathematics semester 2, 4 and 6 who took part in e-learning. Students complete the self-efficacy questionnaire and interview guidelines. The results showed that 5.10% of students had very high self-efficacy, 28.57% high, 38.78% moderate, 21.43% low, and 6.12% very low. Furthermore, interviews were conducted with 6 students with high, medium and low self-efficacy criteria. The interview results show that students with high and moderate efficacy are feeling optimistic in carrying out online learning while students with low efficacy feel not optimistic in carrying out online learning. Their efforts have not been optimal due to several obstacles so they are not sure they can reach the learning target optimally. Students with high, moderate, and low self-efficacy have not been able to understand difficult lecture material through online learning. However, they always try to complete the task on time.

1. Introduction

The covid-19 pandemic is giving a new color to educational institutions, especially higher education. With the implementation of Pembatasan Sosial Berskala Besar (PSBB), students no longer carry out activities within the campus area, but online from their own homes. This condition requires innovation from all lines of education, one of which is through online learning. This also raises a dilemma for several fields of science that require intensive face-to-face processes for students to build understanding of their concepts, especially in the field of mathematics.

Mathematics is known as a subject that is considered difficult by students in schools [1], [2]. Although the concept of mathematics has been introduced since elementary school, solving basic mathematical questions is still a problem for students in higher education institutions [3]. Most of them consider mathematics difficult to learn, very complicated, and difficult to understand. This triggers anxiety in students when studying mathematics. Anxiety that occurs consistently can hamper student performance and attitudes towards mathematics, including confidence in learning [4].Thus, self-confidence is one of the factors that is expected to be a solution for mathematical learning difficulties.

Self-confidence in learning mathematics can be seen in students' self-efficacy. Self-efficacy was first introduced by Albert Bandura as part of social cognitive theory [5], [6]. According to B. J. Zimmerman [7] self-efficacy is defined as a person's self-assessment of the ability to organize and carry out actions to achieve the desired goals. Furthermore, self-efficacy has been identified as a better interpreter of mathematical performance than previous ability or experience within mathematics [8]. Through the development of self-efficacy models conducted by M. Tschannen-Moran, AW Hoy, and WK Hoy [9] sources are known to help improve one's self efficacy, namely mastery learning experiences, vicarious experiences, social persuasion, and physiological and emotional states. This resource serves as a guide in identifying student self-efficacy.

Students mastery of the online learning system presents its own challenges besides the confidence factor in learning mathematics. A study conducted by D. Jamaluddin, T. Ratnasih, H. Gunawan, and E. Paujiah [10] showed obstacles encountered during online learning, namely limited quota, unstable networks, and piled up tasks. As many as 24% of students said this obstacle

affected their psychological condition. Furthermore, this triggers the emergence of self-confidence in students during online learning. Meanwhile, literature studies conducted by M. Sobri, N. Nursaptini, and S. Novitasari [11] state that through online learning, students become more independent in learning. They can independently set and diagnose learning goals, have confidence and responsibility, and conduct self-evaluation.

This condition is an interesting stage to study more deeply considering there are differences between literature studies and research results that have been conducted by previous researchers. For this reason, the researcher would like to examine further about the self-efficacy of mathematics students in online learning during the covid-19 pandemic.

2. Method

This research method is a qualitative research with a descriptive strategy. The self-efficacy data of tadris mathematics students during online lectures during the covid-19 pendemi period were collected in the form of data excerpts as illustrations and supporting information on the data presented. The data report must be detailed in order to provide a clear and complete understanding of this research.

This research was conducted on May 2020 at IAIN Metro Lampung. Research subjects were 98 tadris mathematics students in semester 2, 4 and 6 academic years 2019/2020. Students fill out an online self-efficacy questionnaire. In addition, five students were chosen to fill in self-efficacy interview guidelines in the form of open-ended questions online.

The activities carried out in this study are: (1) observing the students of mathematics during the learning process, and it is assumed that students' self-efficacy influences online learning during the 19th period, so that research is conducted, (2) by distributing self-efficacy questionnaire forms through google forms, (3) 98 tadris mathematics semester 2, 4 and 6 academic years 2019/2020 students filled out the self-efficacy questionnaire form, (4) analyzed the results of the student self-efficacy questionnaire, (5) grouped the results of the self-efficacy questionnaire students based on the criteria of very high, high, medium, low and very low, (6) conducting interviews with 5 students to get more complete data on self-efficacy, (7) checking the observations, questionnaire results and the results of interviews with students.

The instruments used in this study were: (1) self-efficacy questionnaire as many as 35 closed statements using a Likers scale and interview guides as many as 6 open statements, (2) validation, which is a measure that shows the levels of validity or validity of an instrument. Evaluate the content of the self-efficacy questionnaire as many as 3 experts and make revisions if there are notes of the results of the review from experts or validators. 4) Reliability: reliability states to what extent the accuracy of the measurement results. According to Budiyono, the results of measurements that have a reliability index of 0.7 or more are worth the usefulness in the sense that the instrument can be used to make measurements. In this study, for the questionnaire items used with the reliability index is equal to 0.7 or more [12].

The data analysis technique was carried out in the following stages [13]: (1) data reduction: an analysis of the results of the self-efficacy questionnaire resulted in scoring on each response statement (Scoring for positive statements ie score 5 for always answers, score 4 for frequent answers, score 3 for answers sometimes, score 2 for answers ever, and score 1 for answers never, whereas scoring for negative statements is score 1 for answers always, score 2 for answers often, score 3 for answers sometimes, score 4 for answers ever and score 5 for answers never). Furthermore, the level of self-efficacy criteria is sought by converting quantitative data into qualitative data with reference to Azwar [14] in Table 1 of the self-efficacy questionnaire data conversion as follows:

Table 1. Data Conversion of Questionnaire Self-Efficacy

Interval Score	Criteria
$X > \bar{x} + 1,5\ SB$	Very high
$\bar{x} + 0,5\ SB < X \leq \bar{x} + 1,5\ SB$	High
$\bar{x} - 0,5\ SB < X \leq \bar{x} + 0,5\ SB$	Medium
$\bar{x} - 1,5\ SB < X \leq \bar{x} - 0,5\ SB$	Low
$X < \bar{x} - 1,5\ SB$	Very Low

Keterangan:
$\bar{x}$ = a mean score of ideal
SB = ideal standard deviation
X = score of respondents or actual score

If a student's level of self-efficacy criteria has been grouped, then each student is taken from the criteria of self-efficacy very high, high, medium, low and very low to be interviewed.(2) data presentation: observations during online learning and the results of the self-efficacy questionnaire were presented as consideration during the interview for 5 students, then the results of the interview were also presented in the discussion of this study, (3) verification: carried out with methodological triangulation that is checking between observations, the results of the questionnaire with the results of the interview.

3. Result and Discussion

The self-efficacy data were obtained through a self-efficacy questionnaire. Data on the results of the self-efficacy questionnaire of mathematical students are presented in table 2 below.

Table 2. Data on the results of student self-efficacy questionnaires

Remarks	Value
Many items	35
Lowest Score	90
Highest Score	148
Mean Score	123.3
standard deviation	10.4

Further, the criteria for the results of the self-efficacy questionnaire are presented in the following table.

Table 3. Data Criteria of Questionnaire Self-Efficacy

Interval Score	Criteria
$x > 139$	Very High
$90 < x \leq 108$	High
$72 < x \leq 90$	Medium
$54 < x \leq 72$	Low
$x \leq 54$	Very Low

Based on the self-efficacy questionnaire filled out by 98 students, the results were obtained that 5.10% of students havein very high self-efficacy criteria, 28.57% in high, 38.78% in medium, 21.43% in low, the remaining 6.12% of students with very low self-efficacy criteria.The data is presented in the following Figure 1.

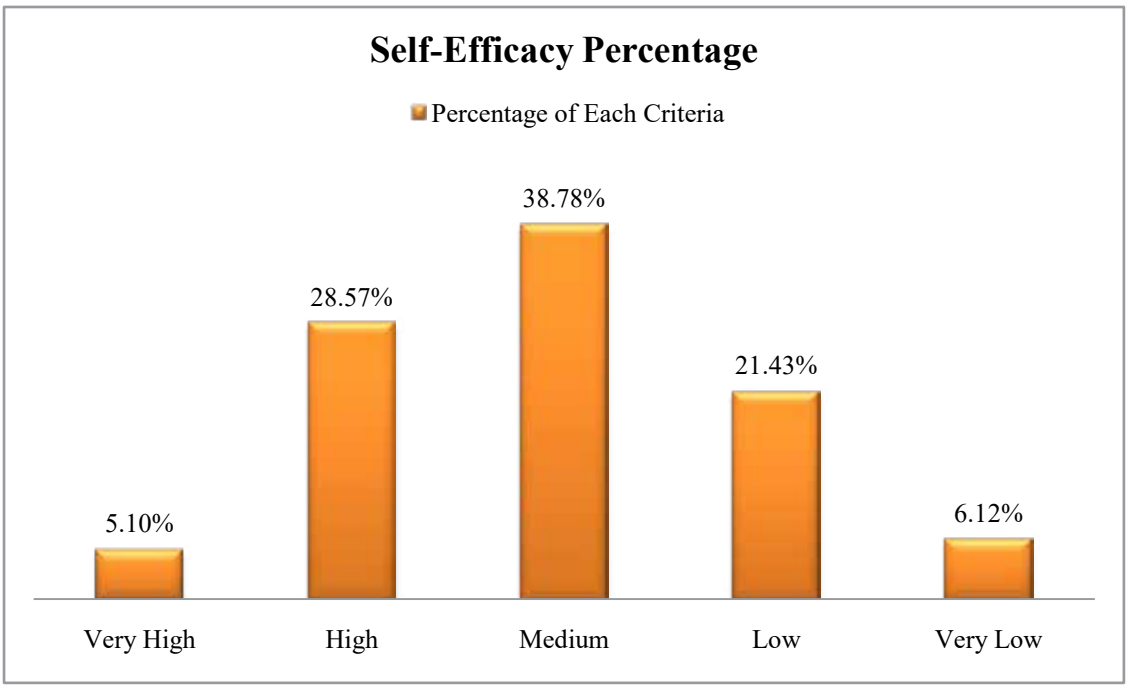

Figure 1. Percentage of Self-Efficacy Questioner Result

Furthermore, 5 students were selected with very high, high, medium, low and very low self-efficacy to be interviewed in order to obtain more in-depth data. Students with very high self-efficacy criteria are E1, students with high self-efficacy criteria are E2, students with moderate self-efficacy criteria are E3, students with low self-efficacy criteria are E4 while students with very low self-efficacy criteria are E5.

The results of the interview with E1 included the following matters. First, E1 believes that online learning is quite effective because it can be done at home and time is flexible while helping parents, but it is quite difficult to understand the material and the eyes get tired quickly because of staring at a laptop. Then, the difficulty faced by online learning tasks by E1 is the lack of sufficient time to work on and understand the material provided and the existence of network constraints so as to collect assignments through the specified deadline. Third, another obstacle felt by E1 during online learning is the network and erratic weather because of living in the village area, in addition to eye fatigue because of staring at the screen for too long in understanding the material, and having to pay more to buy an internet quota package. Fourth, EI's strategy in finding solutions to understanding online learning is by discussing with friends who are smarter, what if it has not been successful then E1 is looking for other learning resources such as YouTube. Fifth, E1 feels optimistic about getting satisfactory results when mid-term and final exam. The following are excerpts from interviews with E1.

"*... It's quite effective because it can be done at home while helping parents despite the perfunctory nature. But it is quite difficult to understand and sometimes hot eyes because staring at the screen for too long not to mention network constraints and erratic weather ... "*
"... It seems like a long time but when we do and understand the material and its problems, it takes longer. Network constraints sometimes make sending tasks too late ... "

The results of the interview with E2 include the following matters. First, E2 believes that the learning system that can be applied in the current pandemic is only online learning, but the drawback is that not all regions have good network access, so online learning is less effective. Secondly, E2 difficulties encountered in online learning tasks are that they cannot be maximized in working on a given task because of the lack of time in working on problems resulting in deadlines for other tasks that must also be done. Third, another obstacle felt by E2 during online learning is network constraints or signals that suddenly disappear during online learning. Fourth, E2's strategy

in finding solutions to understanding online learning is to open diyoutube videos related to the material then to better understand the material recorded or copied in a notebook. Fifth, E2 remains optimistic to achieve satisfactory results during midterm and midterm. E2 believes that the process will not yield results. The following are excerpts from interviews with E2.

"*... I still find it hard to divide my time doing it ... besides I have to repeat the material again, I also have to complete deadlines of other tasks ... Not to mention the deadlines that simultaneously make me sometimes confused which one I will prioritize, as a result the results are not optimal. ... "*
"... When I believe business will not betray the results. So I will try to do UTS/UAS as well as possible. ..."

The results of the interview with E3 included the following matters. First, E3 Online learning in covid emergency 19 is indeed suitable. However, day by day E3 feels that online learning is difficult because face to face alone is sometimes difficult to understand the material. Second, E3 difficulties encountered in online learning tasks are E3 difficulties in understanding material, communication and discussion are felt to be less flexible when using online learning. Third, another obstacle felt by E3 during online learning is financially where online learning uses internet quota which is more wasteful than ordinary days. Fourth, the E3 strategy in finding solutions to understanding online learning is by having direct discussions with friends. Fifth, however, E3 remains optimistic to achieve good results in mid-term and final exam. The following are excerpts from interviews with E3.

"*... when the covid 19 emergency was indeed suitable ... but it was really difficult because face to face alone sometimes it was difficult to understand the material ..."*
"... the strategy I used was to ask a friend and ask a friend who already understood the material to explain the material to me too ..."

The results of the interview with E4 included the following matters. First, E4 believes that online learning is a lighter cost media, but online learning media is difficult to be accepted by all students who have different abilities. Second, E4 difficulties encountered in online learning tasks are E4 difficult when understanding the material delivered whenonline learning and also difficulties when lectures start because of unstable network constraints.

Third, another obstacle felt by E4 when studying online is that E4 feels that the allocation of online learning time at home is less conducive because at the same time carrying out work at home. Fourth, E4 strategy in finding solutions to understand online learning is by always bringing a gadget or cellphone so there is no information left behind about the course. Fifth, E4 is not optimistic to achieve optimal results will get satisfactory results at mid-term examination and final exam. The following are excerpts from interviews with E4.

"*... online is a lighter cost media but this media is difficult to be accepted by all students who have different abilities ..."*
"... another obstacle is the allocation of time so learning done at home sometimes coincides with work at home so it is less conducive ..."

The results of the interview with E5 include the following matters. First, E5 thinks online learning is suitable for now because online we can help the government break the chain of co-19 transmission, but online learning makes E5 find it difficult to understand the material, and requires a long time to understand online material. E5 requires guidance from the lecturer to guide him in understanding the material. In addition, E5 can only study material with the help of YouTube media. Second, E5 difficulties encountered in online learning assignments are that E5 lacks understanding of the material presented, and it takes a long time to study the material delivered by lecturers online. Third, another obstacle felt by E5 is signal constraints during online learning so that the difficulties when working on deadline assignments are close. Fourth, E5 strategy in finding solutions to understand online learning is learning to use YouTube again and again. Fifth, reflecting

on the efforts that have been made, E5 is not sure to achieve optimal results in this online lecture. The following are excerpts from interviews with E5.

"*... Online learning makes it a bit difficult for me to understand the material, and it takes a long time to understand ... and find references via YouTube, ... online learning is appropriate because online we can help the government in breaking the chain of transmission of covid-19...*" "*... Honestly not optimistic you will get satisfying results at midterm and midterm, because of limited understanding of the material and take a long time to learn ...*"

The interview results show that students with very high, high self-efficacy criteria have an optimistic in carrying out online learning while students with very low self-efficacy and low category feels not optimistic in carrying the learning. They have not been able to carry out online learning independently, are still constrained by difficult to understand the material so they still need help from smart friends or lecturers. Online learning requires students to be able to find other learning resources to understand the material, such as learning videos from YouTube or a summary of material from Google. Face-to-face learning and online learning are felt to be very different, because students are accustomed to communicating directly with friends and lecturers, but this time only in the form of learning videos and the difficulty of signal networks. In addition, the increasing number of assignments makes it difficult for students to collect assignments according to the given grace period. According to Michael [15] e-learning is learning that is structured with the aim of using an electronic or computer system so that it is able to support a learning. According to Ardiansyah [16] e-learning is a learning system that is used as a means of teaching and learning carried out without having to face to face with directly between educators and students. Therefore, online learning should be an appropriate learning tool at this time, outside of technical obstacles in the field. Because in principle online learning is one form of learning methods that are perceived to be student centered. Utilization of e-learning is expected to motivate the improvement of the quality of learning and teaching materials, the quality of activities and student independence, as well as communication between lecturers and students and between students [17].

Regarding the assignments given, students with very high, high, medium, low and very low efficacy were less optimistic about being able to collect assignments on time due to several obstacles experienced such as signal and quota that were wasteful. However, they still try to do their work on time. This is in line with M. Yusuf's research [18] showing that students feel the learning process with the Blended Learning Method through Google Classroom becomes inefficient because it requires them to have a data package.

The findings in this study can be a reference for lecturers, aware of the importance of self-efficacy in students when learning online because it has the potential to get the maximum target in improving understanding of online learning. Research conducted by S. Maskar and E. Wulantina [19] concluded that self-efficacy significantly increases learning achievement. Self-efficacy and mathematical abilities also have a strong direct influence on solving mathematical problems [20].

4. Conclusions

The conclusions in this study are 1) 5.10% of students self-efficacy in very high, 28.57% students in high, 38.78% students in moderate, 21.43% students in low, and 6.12% in very low criteria, 2) The students with self-efficacyin very high, high criteria have optimistic in carrying out online learning while students with very low self-efficacy and low are not. Meanwhile, 3) some obstacles in online learning that also affect student self-efficacy during the covid- 19 pandemic such as the students difficult to understand the material and internet networking.

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